

Model-Based Design Tools for Extending COTS Components To Extreme Environments, Phase II

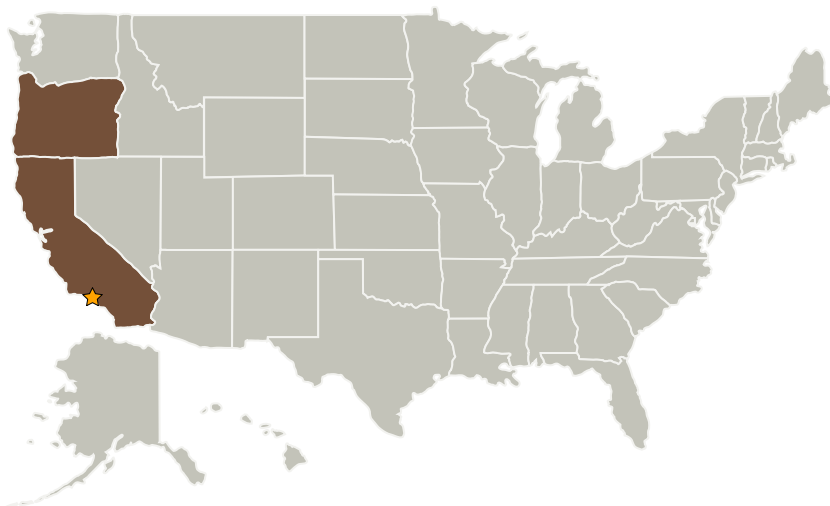
Completed Technology Project (2006 - 2008)



Project Introduction

The innovation in this project is model-based design (MBD) tools for predicting the performance and useful life of commercial-off-the-shelf (COTS) components and COTS-based systems beyond their rated temperature range. Phase I results have shown the feasibility of these tools, which consist of novel modeling tools and advanced system and data analysis capability. The modeling tools differ from all known technologies in that they facilitate the capture of experimental data on COTS devices that get automatically transformed through novel modeling methods into newly created behavioral models with performance degradation and lifetime effects. These tools are relevant and important in providing NASA the means to quantify the reliability and lifetime (i.e., capability and risk) of COTS components and COTS-based systems and provide a trade structure for the assessment of competing technologies. Furthermore, these modeling and design tools provide a means of integrating disparate models, allow agile evolution of models, and encourage MBD reporting mechanisms be used in reviews. Ultimately, these MBD tools will enable lower-cost system development and cost versus lifetime assessment, shorten development time, and extend flight-proven technology to broader applications. Lynguent plans to develop MBD tools based on its Phase I feasibility study and to utilize a high temperature testbed (DC-DC converter) as a case study to demonstrate a calibration methodology for the tools to insure accuracy with respect to accelerated testing results. This calibration methodology will be developed in consultation with leading experts in the field of reliability modeling and high temperature measurements of electronics and packaging.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory (JPL)	Lead Organization	NASA Center	Pasadena, California
Lynguent, Inc.	Supporting Organization	Industry	Portland, Oregon

Primary U.S. Work Locations

California	Oregon
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
 - └ TX02.2 Avionics Systems and Subsystems
 - └ TX02.2.8 Use of Advanced Commercial-off-the-Shelf (COTS) Technologies